

Department of Forest Products Technology

Puu-0.3210 Natural Fibre Materials Science

Examination 12th December 2013

Total Marks 35

1. In one or two sentences explain the following terms, using a diagram to support your answer where appropriate and include any relevant formulae: (5 marks)
 - i. "Young's modulus"
 - ii. "Yield point"
 - iii. "Hydrogen bonding"
 - iv. "Spreading and wetting"
 - v. "Fatigue"

 2. Draw a diagram to show the relationship between equilibrium moisture content (EMC) and the relative humidity (RH) of the surrounding air. Also show how i) the history of the specimen and ii) temperature affects this relationship. (2 marks)

 3. Draw a diagram of the cell wall of a lignocellulosic (natural) fibre and describe its structure in words (3 marks)

 4. Answer one of the following (answer should be around 1 page): (5 marks)
 - i. Divide the progress of creep in paper into phases of recoverable and permanent changes
 - ii. Describe the phenomenon of creep in wood and explain how changes in moisture content, temperature and load level affect creep

 5. Discuss in around 2 pages one of the following (use diagrams where necessary to support your answers): (10 marks)
 - i. Describe the formation and effect of defects in wood
 - ii. Describe the formation of interfibre bonds during papermaking – mechanism plus role of water and filler

 6. Write an essay (around 2 pages in length) on one of the following topics: (10 marks)
 - i. Wood and water
 - ii. Hornification of papermaking fibres – mechanism and effect on paper strength
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